TOXIC WASTE RECEPTACLE

FIELD OF THE INVENTION

[0001] This invention is directed to a receptacle for toxic waste. More particularly, the invention is directed to a toxic waste receptacle that includes an internal bag closure mechanism that is operable from outside the waste receptacle.

BACKGROUND

[0002] Various types of trash cans and other waste receptacles that use disposable liners, are widely used in various industries. Conventional trash cans include a cover disposed to seal the open end of the receptacle and a flexible bag or liner disposed in the receptacle. The flexible bags are commonly made of impervious materials such as plastic. The conventional method for handling industrial trash is to open the cover of the trash can and dispose trash within the open bag that is positioned within the trash can. When the bag is full, the cover is again opened and the open bag is removed by custodial or other personnel who must then manually close the bag to package the waste it contains.

[0003] Many industries generate toxic waste. Toxic waste materials may include various parts, containers, wipes or towels that contain toxic materials. When such toxic waste materials are stored in conventional trash cans, toxic gases are produced in the trash can interior and released when the cover of the trash can is opened. The toxic gas emitted from the trash can escapes into the working environment and can be harmful to custodial and other personnel within the area. Such introduction of toxic materials into the working environment can result in serious illnesses and other maladies.

[0004] Additionally, these toxic contaminants that escape into the working environment can also contaminate and destroy the products being manufactured in the area. In the semiconductor manufacturing industry, for example, toxic waste that includes IPA (isopropyl alcohol), Cl_2, HCN and HCl is commonly generated. Using conventional trash receptacles, these toxic contaminants can diffuse into the work

environment and cause corrosion and other failure mechanisms to occur on the semiconductor devices and substrates present in the working environment. Conventional trash receptacles therefore include shortcomings that render them unacceptable for handling toxic materials in a working environment.

[0005] It would therefore be desirable to provide a receptacle for toxic waste that prevents toxic waste from escaping into the working environment.

SUMMARY OF THE INVENTION

[0006] To achieve these and other objects, and in view of its purposes, this invention addresses the shortcomings of conventional toxic waste receptacles and provides a waste receptacle that prevents or eliminates toxic gases from escaping into the working environment.

[0007] In an exemplary embodiment, the invention provides a waste receptacle comprising an exterior wall that separates an interior from an exterior, an interior receptacle for receiving a bag therein, spaced from the exterior wall. The waste receptacle also comprises an interior bag closure mechanism that is operable from the exterior of the waste receptacle.

[0008] In another exemplary embodiment, the invention provides a waste receptacle comprising an exterior wall, an interior receptacle for receiving a bag therein, a cover that sealably engages an upper rim of the exterior wall, an exhaust hood including an exhaust port, an exhaust system that exhausts the waste receptacle through the exhaust port, and an interior bag closure mechanism that is operable from the exterior of the waste receptacle.

[0009] In yet another embodiment, the invention provides a waste receptacle comprising an exterior wall, an interior receptacle for receiving a flexible bag therein, and a rotator assembly that grasps an upper open end of a flexible bag disposed within the interior receptacle and rotates the upper open end relative to a bottom closed end of the flexible bag, to close the flexible bag.

BRIEF DESCRIPTION OF THE DRAWING

[0010] The invention is best understood from the following detailed description when read in conjunction with the accompanying drawing. It is emphasized that, according to common practice, the various features of the drawing are not necessarily to scale. On the contrary, the dimensions of the various features are arbitrarily expanded or reduced for clarity. Like numerals denote like features throughout the specification and drawing. Included are the following figures.

[0011] FIG. 1 is a cross-sectional side view of an exemplary toxic waste receptacle;

[0012] FIG. 1A is an expanded cross-sectional view of an exemplary rotator assembly;

[0013] FIG. 2 is a top, plan view of the exemplary rotator assembly;

[0014] FIG. 3 is a top, cross-sectional view of an exemplary exhaust hood;

[0015] FIG. 4 shows an interior perforated wall of the exhaust hood shown in planar configuration for clarity;

[0016] FIG. 5 is a cross-sectional view illustrating the exhaust system of the invention; and

[0017] FIG. 6 is a cross-section side view illustrating an exemplary situation in which the flexible bag closed for packaging waste materials.

DETAILED DESCRIPTION

[0018] FIG 1 is a cross-sectional view showing an exemplary waste receptacle according to the invention. Waste receptacle 3 includes tank portion 5 and exhaust hood portion 7 disposed above tank portion 5. Tank portion 5 includes double walls 9. Double walls 9 include outer tank wall 11 and inner tank wall 13. Gap 15 is formed between outer tank wall 11 and inner tank wall 13. In an exemplary embodiment, the waste receptacle is cylindrical such that outer tank wall 11 is cylindrical and inner tank wall 13 is cylindrical and gap 15 forms an annular space therebetween. Waste receptacle 3 further includes bottom 17 and cover 19.

[0019] Exhaust hood portion 7 includes outer wall 21 and vented, or gas-permeable inner wall 23 that includes openings 25 in the exemplary embodiment. Outer

wall 21 and outer tank wall 11 combine to form a substantially continuous exterior wall of waste receptacle 3. Exhaust hood portion 7 and tank portion 5 combine to form can 27 that includes upper lip 29.

[0020] Cover 19 includes handle 89 and rubber sealing portion 31 that sealably engages upper lip 29 to seal interior 33 of waste receptacle 3. Pedal 57, disposed outside of waste receptacle 3 works in conjunction with a linkage mechanism to automatically open cover 19. The linkage mechanism includes shafts 59A and 59B. Lower shaft 59A forms a lever by pivoting about pivot member 61. In this manner, cover 19 can be opened without being contacted by the user's hand, as the user simply steps on pedal 57.

[0021] Exhaust hood portion 7 includes exhaust port 35 which is an opening that extends through outer wall 21. Gases within interior 33 of waste receptacle 3 are drawn through exhaust port 35 and directed through exhaust conduit 37 and away from waste receptacle 3. Conventional pumping or bellows systems may be used to exhaust waste receptacle 3 through exhaust port 35. Manual shutoff valve 39 is provided as a safety shutoff to cut off exhaust flow 41.

[0022] Bag 43 is received within interior receptacle 81 formed by inner tank wall 13 of tank portion 5. Inner tank wall 13 is internally spaced from outer tank wall 11. Bag 43 may be formed of various flexible or deformable materials such as plastics or other polymers and is chosen to be impervious and impermeable to the waste materials that will be disposed in bag 43. Bag 43 includes closed end 45 which rests on bottom 17 and open end 47 which is in the upper position in the illustrated embodiment. Bag 43 includes walls 49 and is shown in the open position for receiving waste, by solid lines 51, and in the closed position by dashed lines 53. Bag 43 may also be referred to as a liner.

[0023] An aspect of the invention is an interior bag closure mechanism that is operable from the exterior of waste receptacle 3. In the exemplary embodiment, the interior bag closure mechanism includes rotator assembly 63, including handle 65. Further components of rotator assembly 63 are shown more clearly in FIG. 1A.

[0024] FIG. 1A is a cross-sectional view showing portions of rotator assembly 63 in further detail. Rotator assembly 63 includes clamp 67 that secures lip 69 of open end

47 of bag 43, to rotating member 71. Rotating member 71 includes flange section 73 that is received within cavity 75 formed within the previously defined exterior wall of waste receptacle 3. Ball bearings 77 enable flange portion 73 to rotate freely within track 79 formed by cavity 75. Rotating member 71 may be formed of various sturdy materials. Handle 65 (FIG. 1) is coupled to rotating member 71 and may be turned to cause rotating member 71 to rotate and bag 43 to open or close with cover 19 in the closed or open position. Various conventional techniques may be used to couple handle 65 to rotating member 71 such that handle 65 causes rotating member 71 of rotator assembly 63 to rotate. Handle 65 is exemplary only and other conventional devices may be disposed outside of waste receptacle 3 to cause the rotation of rotating member 71.

[0025] Referring again to FIG. 1, since lip 69 of open end 47 of bag 43 is securely affixed to rotating member 71 by means of clamp 67, when rotating member 71 rotates, open end portion 47 of bag 43 rotates relative to closed end 45 of bag 43. In an exemplary embodiment, the weight of the contents of bag 43 enable the bulk of bag 43 within interior receptacle 81 to remain stationary, or fixed, as open end 47 of bag 43 rotates relative to closed end 45. In an other embodiment (not shown) clamping or other securing means may be used to secure the bulk of bag 43 into position so that it does not rotate when top portion 47 of bag rotates due to the rotational movement of rotating member 71. For example, closed end 45 may be releasably clamped to bottom 17.

[0026] FIG. 2 is a top view showing inner tank wall 13 that forms interior receptacle 81 that receives bag 43 (not shown), and rotating member 71 which rotates as indicated by arrow 85, with respect to stationary inner tank wall 13. In the illustrated cross-sectional top view embodiment of an exemplary cylindrically shaped waste receptacle, it can be seen that each of inner tank walls 13 and rotating member 71 are annular in shape and concentrically configured. Other shapes and relative configurations may be used in other exemplary embodiments.

[0027] FIGS. 3 and 4 show further details of the exhaust hood. FIG. 3 shows a top, cross-sectional portion and a schematic portion. Exhaust hood portion 7 includes outer wall 21 and gas-permeable inner wall 23 which includes openings 25 in the

exemplary embodiment. Pump 83 may be used to exhaust waste receptacle 3 through exhaust port 35. In an exemplary embodiment, gas-permeable inner wall 23 may be a mesh material or it may include perforations there through. FIG. 4 shows a swatch of an exemplary gas-permeable inner wall 23 which includes openings 25. The swatch of gas-permeable inner wall 23 is shown in planar view for illustrative purposes but conforms to the annular shape in the exemplary embodiment illustrated in FIG. 3. Other suitable styles and arrangements of gas-permeable inner wall 23 may be used an inner wall within exhaust hood portion 7 such that gases from interior 33 may be exhausted through gas-permeable inner wall 23 and exhaust port 35. The generally round shape of waste receptacle 3 is intended to be exemplary only and more than one exhaust port 35 may be used in other exemplary embodiments and advantageously positioned in various locations.

[0028] FIGS. 5 and 6 illustrate two advantageous applications of the invention. In FIG. 5 cover 19 is closed and bag 43 is in the open position. With the exhaust system operating, the pollutants within bag 43 are exhausted through exhaust port 35. This reduces the gaseous contaminants within interior 33 of waste receptacle 3. The exhaust system generates a negative pressure to remove a large volume of toxic pollutants from interior 33.

[0029] FIG. 6 shows another advantageous aspect of the invention. Bag 43 is closed and seated within interior receptacle 81. Bag 43 may be automatically closed as described above, with cover 19 being in the opened or closed position. With cover 19 opened and bag 43 closed as in FIG. 6, the pollutants are contained within the bag and do not escape into the working environment when cover 19 is open. The trash is thereby packaged within bag 43. This configuration may advantageously be used when bag 43 is full and a custodian desires to remove bag 43 from waste receptacle 3. In an exemplary embodiment, the escape of toxic pollutants may be prevented by maintaining bag 43 in an open position and the exhaust system on, when cover 19 is closed such as shown in FIG. 5, and then closing bag 43 using the interior bag closure mechanism of the invention prior to opening cover 19. In this manner, when cover 19 is opened to remove bag 43, toxic pollutants have either been withdrawn from waste receptacle 3 through the exhaust system or safely contained within bag 43.

[0030] In another exemplary embodiment, bag 43 may be in the opened configuration when cover 19 is opened, to facilitate the introduction of trash into waste receptacle 3.

[0031] The preceding merely illustrates the principles of the invention. It will thus be appreciated that those skilled in the art will be able to devise various arrangements which, although not explicitly described or shown herein, embody the principles of the invention and are included within its spirit and scope. Furthermore, all examples and conditional language recited herein are principally intended expressly to be only for pedagogical purposes and to aid the reader in understanding the principles of the invention and the concepts contributed by the inventors to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions. Moreover, all statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass both structural and functional equivalents thereof. Additionally, it is intended that such equivalents include both currently known equivalents and equivalents developed in the future, i.e., any elements developed that perform the same function, regardless of structure.

[0032] This description of the exemplary embodiments is intended to be read in connection with the figures of the accompanying drawing, which are to be considered part of the entire written description. In the description, relative terms such as "lower," "upper," "horizontal," "vertical,", "above," "below," "up," "down," "top" and "bottom" as well as derivatives thereof (e.g., "horizontally," "downwardly," "upwardly," etc.) should be construed to refer to the orientation as then described or as shown in the drawing under discussion. These relative terms are for convenience of description and do not require that the apparatus be constructed or operated in a particular orientation. Terms concerning attachments, coupling and the like, such as "connected" and "interconnected," refer to a relationship wherein structures are secured or attached to one another either directly or indirectly through intervening structures, as well as both movable or rigid attachments or relationships, unless expressly described otherwise.

[0033] Although the invention has been described in terms of exemplary embodiments, it is not limited thereto. Rather, the appended claims should be

construed broadly, to include other variants and embodiments of the invention, which may be made by those skilled in the art without departing from the scope and range of equivalents of the invention.